



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

HINDU-ARABIC NUMERALS

The Hindu-Arabic Numerals. By DAVID EUGENE SMITH and LAUS CHARLES KARPINSKI. Boston and London: GINN & Co., 1911. pp. vi+160.

Everybody knows, or should know, that our numerals, which we generally call 'Arabic figures', were called by the Arabs themselves 'Indian numbers'. The idea of representing the successive powers of ten by difference of position ought, one should have thought, have been suggested by the use of the Abacus, which actually makes use of this device; but, as a matter of fact, it was left to the Indians to conceive the idea of representing a missing place in the decimal scheme by a special symbol which we now call 'zero'; and Brockhaus has ingeniously observed that it very appropriately fell to the lot of the Hindu to invent a mathematical term for 'nothingness', corresponding to the 'nirvana' of the national creed.

Professor David E. Smith and Dr. L. C. Karpinski have written a little book on the Hindu-Arabic numerals, in which they have industriously brought together a great deal of information about the form of these numerals in Indian inscriptions and early manuscripts, distinguishing those which have a place value from those which have not. They give a separate chapter to the key symbol 'zero', which was originally a dot among the Hindus, as it still is among the Arabs. As is well known, our very expression 'to cipher' is from the same Arabic root as 'zero', which is called by the Hindus 'sunya', or 'void'. An elaborate chapter is given to what is known as the Boethius Question because, in some manuscripts of Boethius, a series of numerals from 1 to 9, said to correspond to the Arabic 'dust numerals', resemble very closely the Arabic and our own figures. If so, this would bring back the introduction of these figures into the sixth century at latest. The question is, however, merely

academic, since, without 'zero', the value of these 'dust numerals' would be zero.

The sixth chapter of our authors deals with the development of the numerals among the Arabs, and here comes in the special interest of the subject for the readers of the JEWISH QUARTERLY REVIEW. Our authors discuss the possibility of the numerals having come from India in two forms and through two routes, one through Kabul corresponding to the present Arabic numerals among the Arabs, and the other through Bagdad, the original of the European 'Arabic figures'. Now at Bagdad, in the reign of Mamun, two treatises were composed on the Indian arithmetic with the new 'zero' symbol, one by Mohammed ibn Musa al-Khowarazmi, from one of whose treatises we get the title of algebra, and from whose name we get the obsolete name of Indian arithmetic 'Algorism'. The other treatise was written by Sened ibn Ali, a renegade Jewish astronomer. In the treatise on Education by Samuel ibn Abbas, given by Guedemann at the end of his *Unterrichtswesen*, it is stated that after the boy became *Barmizwah* he studied Indian arithmetic and astronomy in his fourteenth year.

But there is possibly an even earlier and more important connexion of the Jews with the introduction of Indian numerals west of the Indus which our authors have not considered. In Steinschneider's essay on the History of Translations from Indian into Arabic, in the twenty-fourth volume of *ZDMG.*, pp. 353-4, he translates a passage from Abraham ibn Ezra in which that writer declares that it was a Jew who translated Kalila wa-Dimna in the reign of Es-Saffa'h, c. A. D. 750, and brought back an Indian scholar who taught the Arabs the Indian numerals from Arin or India.¹ Now our authors state that the first definite trace that we have of the introduction of the Hindu system into Arabia dates from A. D. 773 (page 92); and this chimes in, as regards time, with the tradition reported by Abraham ibn Ezra.

¹ I observe in Mr. Murray's recently-issued *History of Chess*, p. 154, that chess was also introduced at the same time as Kalila wa-Dimna, according to Masudi.

It is thus possible, though the matter requires more thorough investigation, that the colporteur of our present Arabic figures, from India to Persia, was a Jew.

As regards the definite introduction of the numerals into Europe, here again our authors introduce a certain amount of Jewish interest by quoting the well-known account of the travels of Jewish merchants, given by Ibn Khordadbeh. As they remark (p. 101), 'such travellers, about A. D. 900, must necessarily have spread abroad a knowledge of all number systems used in recording prices or in the computations of the market'. Pope Sylvester brought back from Spain a new kind of numerals with Apices at the top which have Arabic names derived from Morocco; but these seem to correspond more to the Gobar or 'dust numerals'. The Spanish Jew, John of Seville, adapted Al-Khowarazmi's work about A. D. 1140, and this was one of the earliest treatises on Algorism or practical Indian arithmetic as opposed to the use of the Abacus about the same time. Abraham ibn Ezra knew the Indian arithmetic which he refers to in his Book of Numbers in which he uses the first nine letters of the Hebrew alphabet, with the nine figures and a circle for zero. The final chapter of our authors deals with the spread of the numerals in Europe chiefly through Leonardo of Pisa, after whose time the use of these figures becomes more and more frequent, and the investigation fades into the light of common day.

Sufficient has been said to indicate the interest and value of this little book, which has evidently involved a large amount of research on the part of the authors. They have scarcely presented the results of their work in very readable or accessible form, but the materials are there with all requisite references. If I have ventured to indicate one or two lacunae in their investigations, which have particular bearing upon the part taken by Jews in this important movement, I am only enabled to do so by the fortunate chance that I have made special study of the Bidpai literature.

JOSEPH JACOBS.

New York.